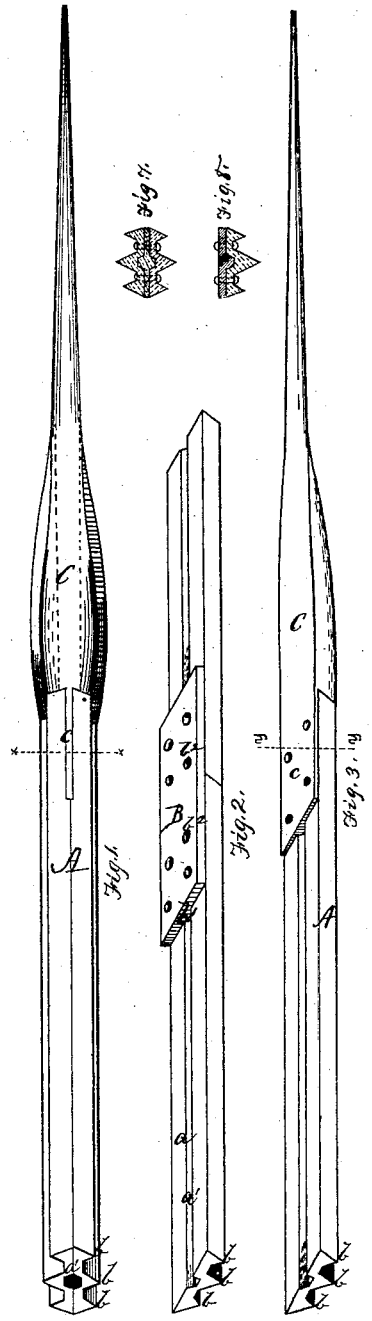
2 Sheets—Sheet 1.

J. J. COLE.

LIGHTNING-RODS.

No. 185,430. Patented Dec. 19, 1876.



Witnesses.

James L. Kay

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2 Sheets—Sheet 2.

J. J. COLE.

LIGHTNING-RODS.

No. 185,430. Patented Dec. 19, 1876.

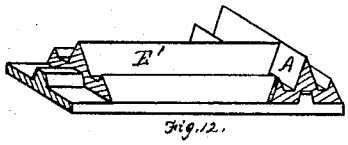

Fig. 12.

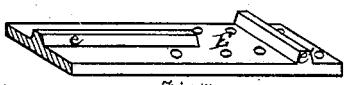

Fig. 14.

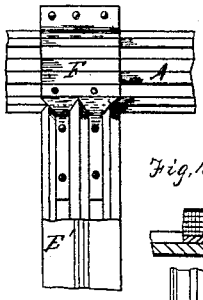

Fig. 13.

Fig. 15.

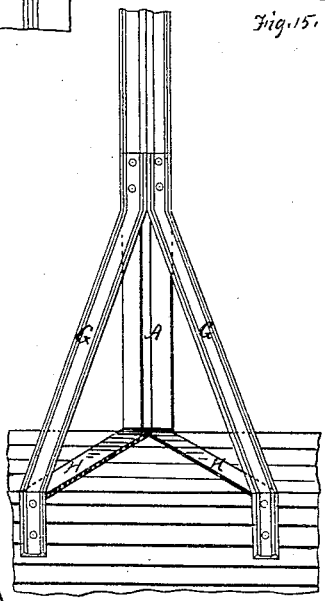

Fig. 10.

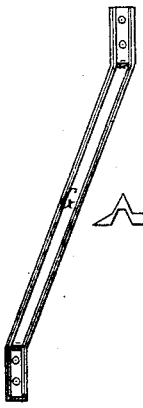

Fig. 11.

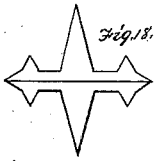
Fig. 18.


Fig. 19.

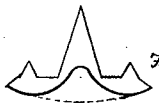
Fig. 20.

Fig. 16.

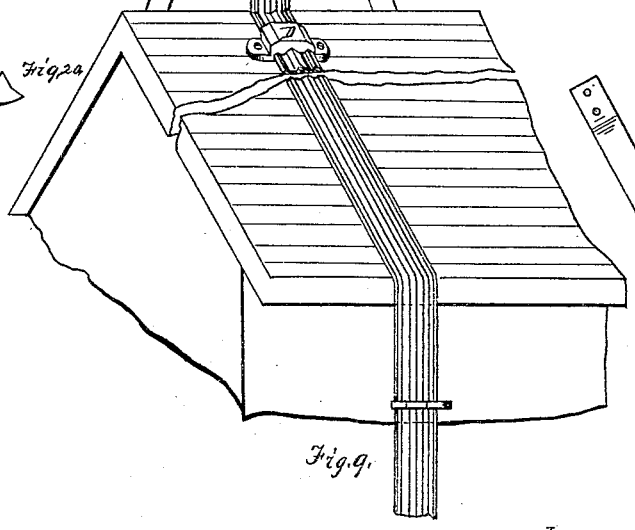

Fig. 9.

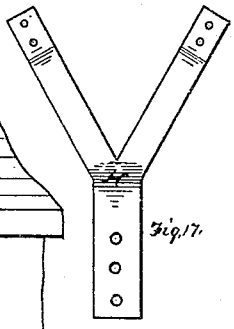

Fig. 17.

Witnesses

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UNITED STATES PATENT OFFICE.

JOHN J. COLE, OF ST. LOUIS, MISSOURI.

IMPROVEMENT IN LIGHTNING-RODS.

Specification forming part of Letters Patent No. **185,430**, dated December 19, 1876; application filed March 23, 1876.

To all whom it may concern:

Be it known that I, JOHN J. COLE, of St. Louis, in the county of St. Louis and State of Missouri, have invented a new and useful Improvement in Lightning-Rods; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figures 1 and 3 are views of rods and points embodying my invention. Fig. 2 shows the manner of jointing; Figs. 4, 5, and 6, attachments or devices for attaching the rod to a building. Fig. 7 is a section on the line *x x* of Fig. 1. Fig. 8 is a section on the line *y y* of Fig. 3. Figs. 9, 10, and 11 represent that portion of my rod which is elevated above the building, as supported by the standard-legs attached thereto, with the switch between the same. Figs. 12, 13, and 14 represent my double connectors, or T-splice-plate devices for connecting two or more rods together, or for branch rods with the main line. Fig. 15 shows staple-rivet for connecting joints of rod. Fig. 16 is a section of a point, showing platinum wire. Fig. 17 is a detached view of the switch used between the standards. Figs. 18, 19, and 20 illustrate modifications based on the plain-back and ribbed-face rods.

Like letters refer to like parts wherever they occur.

My invention relates to the construction of lightning-rods and their attachments; and consists, first, in forming the rod with one flat or plain surface, having a splice-groove and a longitudinally ribbed or guttered face, whereby the rod may be employed in single line, and will apply itself to the building, or may be used in double line, back to back, if preferred; second, in forming the point with a platinum wire of sufficient length to prevent the destruction of the point by a discharge of lightning, the body of the point being cast upon the wire at the time the point is formed; third, in supporting the upright portion of the rod above the building by braces connected directly to the main rod and building, in which the main rod may form one leg of the brace, if desired; fourth, in connecting the brace and ground rods by a metallic connection or switch, forming a circuit to facilitate the discharge of that portion of the electricity with which the braces may become charged; fifth, and finally, in details of construction pertaining to the rod and its attachments, hereinafter more specifically set forth.

Upon investigation I have discovered that it is as necessary to attach a properly-constructed point to the lower end of the lightning-rod, which goes into the ground, as to the upper end, which extends into the air, for the following reasons: first, to discharge the positive electricity which is received by the rod from the cloud, and, second, to receive upon the rod the negative electricity, which, under certain circumstances, is discharged by the rod from the earth into the air. It is a well-established fact that a fine point is the best discharger of electricity as well as the best receiver of it; therefore, every lightning-rod should be provided with a properly-constructed point at each end. But scientists, in their treatises upon the subject, have not described such a rod, and manufacturers of lightning-rods, in the practical application of the science, have, in no instance, furnished their rods with a ground point.

While great stress has been laid upon the necessity of a properly-constructed point for the top of the rod, no attention has been paid to the furnishing of a point to receive and discharge electricity at the earth. Now, I meet this requirement by attaching to the lower end of my lightning-rod a platinum-tipped point, constructed substantially as the point above described in second statement of invention, with such changes as render it more suitable for a ground point, and leaving off the ornamental finish, which would be useless under ground.

I will now proceed to describe my invention, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A indicates the rod, which may be made solid, or of sheet metal, or of any suitable metal, preferably iron and solid, formed with a flat back, *a*, which is generally grooved, as at *a'*. Upon the reverse or face of the rod are a series of longitudinal ribs or flanges, *b b b*, the middle rib, when three are used, being preferably larger than the edge ribs. This form of rod gives an increased

conducting-surface with the requisite strength and lightness; and when the rod is rendered negative, the positive current, by the mutual repulsion of its particles, will travel on the two outer flanges, leaving the central flange either as neutral ground or for the ascent of the negative current; it is therefore essential that the flanges or ribs shall be of unequal height. When the groove *a'* is omitted the joint between the sections may, in a single line of rod, be made by riveting a flat plate to the sections by a thimble, or in any of the well-known ways; but as I preferably groove the flat face of the rod, I have provided a special connecting-plate, B, which corresponds in width with the rod, and has upon one face a longitudinal rib, b^1, which corresponds to the groove *a'* of the rod. The ends of the sections, being adjusted, (see Fig. 2,) are secured by staple-rivets b^2, Fig. 15, which lie within the gutters formed by the ribs *b b*, thus lapping or crossing the joint, insuring contact, and increasing the strength of the joint. C indicates the point, which may be used either as an initial or terminal point, and which may vary in shape, (see Figs. 1 and 3,) according as it is used with a single or double line of rod, but, in either case, constructed on the same principle. It is preferably grooved at its lower portion to correspond with the ribbed rod, and is provided with a flange, *c*, by means of which it may be riveted to the single or between the double line of rod of the superior section. The points C are usually of copper, and are provided with a central wire, *c'*, Fig. 16, of platinum, which is inserted at the time of forming or casting the point, so that, should the point be melted at any time, it does not become useless, as is the case where it is simply tipped in the ordinary manner, but may be removed, sharpened, and replaced at little expense and with slight labor. Platinum-tipped points, as ordinarily constructed, in which the wire is secured in the tip by soldering, the passage of the electricity destroys the solder, and the wire becomes loose in its socket, and is liable to fall out, and, having no proper metallic contact with the body of the point, is comparatively useless if it remains in. This difficulty I overcome in my point by casting the body of the point about the platinum tip, thus making a union between the two that is not destroyed by the passage of the electricity, and which serves to retain the wire firmly in place, however often the point may be subjected to a discharge of lightning. Where the wire extends the whole length of the point, it will serve to re-enforce the conducting power of the point, and, by facilitating the transmission of the charge to the main rod, (the wire itself being capable also of sustaining high heat,) will materially retard or even prevent the melting of a point. When the sole object is to permit of the resharpening the point, the wire need not be extended for more than an inch and a half or two inches, as more would only add to the expense of the point, and, so far as is at present known, the heaviest discharge has seldom melted more than from three-fourths to one inch of a point, and this is not likely to occur if the contact is perfect and a terminal point (as hereinafter specified) is employed.

D D^1 D^2, Figs. 4, 5, and 6, are a series of devices devised by me, and adapted for securing the rod to buildings. Of these D D^1 are especially intended for the single rod, and are grooved, as at *d d'*, to fit the ribbed face, the flat face of the rod resting against the building. D^2 may be employed when the rod is used double, (see Fig. 1,) and its shape is such that it may be sprung open to introduce the rod, after which it may be bent together to clamp the rod securely. E, Fig. 14, is a splice-plate or connector for making connections between two or more rods, or connecting branch rods with the main line. This plate is generally of equal width with the rod, and has a longitudinal rib, *e*, which fits the groove *a'* of the branch, and a transverse rib, *e'*, which fits groove *a'* of the ground rod. In making the connection between the branch and ground rods the branch rod E', Fig. 12, is preferably beveled, so as to fit snugly against the ground rod A. The splice-piece and rods are then usually covered by a sheath or cap-piece, F, Fig. 13, and the whole secured by rivets, as indicated in the drawings.

By means of the attachments D D^1 D^2, before specified, the rod may be attached to any building in the well-known manner; but instead of the tripod or common method of bracing the point-rod, or that portion elevated above the ridge of the building, I use a double rod or blank for a short distance below the point, (similar to what is shown in Fig. 1,) so as to strengthen and stiffen the rod, and make a neater and better connection between the rod and point. I also provide a series of brace-rods, G G, which may be plain, but are preferably ribbed longitudinally upon one face, which rods I rivet to the main or point rod (see Fig. 10) a short distance below the point, and then spread them out, and secure them to the roof in such a manner as to brace and sustain the point-rod. H indicates a Y or other shaped metal (preferably copper) plate, which I term a "switch," and which is so arranged as to connect the distant ends of the brace-rods with the main rod, thus completing the circuit, and facilitating the discharge of any electricity with which the brace-rods may become charged.

To the lower or ground end of the rod I connect a terminal point, which may be made substantially like the upper point, except that the silver plating would usually be omitted as simply adding to the expense and not necessary for utility or appearance.

The preceding description has been mainly directed to a single rod or blank; but one of the main advantages of the form or shape shown is, that by placing the rods or blanks

back to back a strong and symmetric double rod is obtained, similar to what is illustrated in Fig. 1.

When the double line is used the sections may be connected by lapping or breaking joints and riveting without the use of splice-plates, but retaining the staple-rivet before described. For securing such a rod to the building the device shown in Fig. 4 has been provided.

The rod may or may not be insulated, as preferred. It is especially adapted to be used without insulation. If insulated, the single rod is supported upon and wired to an insulator having a rib to fit the groove *a'* of the flat face of the rod; the double rod would be insulated by an ordinary ring-insulator. In all cases I prefer a platinum wire in the point, as specified; but, instead of platinum, any metal the melting-point of which exceeds that of the copper may be substituted, provided such metal resists corrosion and is a good conductor.

Among the advantages of my rod are the readiness with which it may be produced by the rolls; its great strength in proportion to the contained metal; its adaptation to plain surfaces and improved general appearance; the facility and cheapness by which joints may be made without apparent interruption of the continuity of the rod, as occurs where thimbles are used; the better contact between sections obtained; the increased conducting-surface when, as in roof-rods, &c., the grooves contain water; and if lateral discharges occur, the ribs form a continuous point, which will, in case of a single rod, serve to direct the discharge away from the building.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The rod herein described, having a flat face, *a*, grooved as at *a'*, and a series of longitudinal ribs upon the reverse face, the central rib of the series projecting beyond the side ribs, substantially as specified.

2. A lightning-rod having the flat face *a*, grooved as at *a'*, and the reverse ribbed face, substantially as and for the purpose specified.

3. In combination with the sections of rod A, having grooves *a'*, the longitudinally-ribbed splice-plate, substantially as and for the purpose specified.

4. In combination with two or more sections of rod, A, having grooves *a'*, the longitudinally and transversely ribbed splice-plate, substantially as and for the purpose specified.

5. In combination with two sections of rod, A, having grooves *a'*, the longitudinally-ribbed splice-plate and staple-rivet, substantially as and for the purpose specified.

6. In combination with two or more sections of rod, A, having grooves *a'*, the longitudinally and transversely ribbed splice-plate, and the cap or sheath, substantially as and for the purpose specified.

7. The combination of the upright or point rod and the brace-rods G G, connected directly to the point-rod, substantially as and for the purpose specified.

8. The combination of the upright or point rod, the brace-rods connected thereto, and the switch, substantially as and for the purpose specified.

9. A lightning-rod point provided with a central wire of platinum throughout its length, substantially as and for the purpose specified.

10. In combination with a lightning-rod, a terminal or ground point, properly tipped and protected with platinum or other suitable metal, substantially as and for the purpose specified.

11. A lightning-rod point provided with a platinum tip cast therein, as and for the purpose set forth.

In testimony whereof I, the said JOHN J. COLE, have hereunto set my hand.

JOHN J. COLE.

Witnesses:
F. W. RITTER, Jr.,
JAMES I. KAY.